LETTERS TO THE EDITOR

The ups and downs of high altitude mountaineering

EDITOR,—Professor Craig Sharp delighted us with a recent account of his world record ascent of Mt Kilimanjaro in the 1960s and voiced his concerns about the physiological dangers inherent in such a feat;[1] the madness and exuberance of youth! It is interesting to note that this record was established during the height of one of the most unforgettable debates in mountaineering history provoked by the initial uncertainties of Barcroft, Margaria, and Henderson, the possibility of an "oxygenless" ascent of Mt Everest. The epochal ascent without supplemental oxygen by Messner in 1978 subsequently put paid to any speculation and reinforced what T H Huxley (1825–1895) once remarked "The great tragedy of science; the slaying of a beautiful hypothesis by an ugly fact!"

The "get up and get down" philosophy of mountaineering has become an increasingly popular practice among enthusiasts who are either pitting their physical attributes against the stopwatch or, as Messner would maintain, merely limiting their time spent in the "death zone". Perhaps the most astonishing feat of all was achieved during an Italian expedition to Mt Everest in May 1996 when Hans Kammerlander summited via the North Col in a record time of 17 hours and then descended to basecamp on skiis! However, although extending the envelope of human endurance, the risks inherent in such an extreme sport simply cannot be ignored.

For example, research in our laboratory has recently indicated a pronounced increase in metabolic biomarkers of free radical and skeletal muscle damage at 5100 m due primarily to the oxidative and reductive stress imposed by physical exercise and environmental hypoxia respectively. We have also incriminated free radicals in the pathophysiology of acute mountain sickness and endothelial dysfunction at high altitude.[2] Thus, when one considers the average hourly ascent rates by Sharp and Kammerlander of about 611 m and about 215 m respectively compared with the more leisurely 12–30 m typically encountered during a Himalayan expedition, the potential for suffering at the hands (or more appropriately electrons!) of these ubiquitous biomolecules is all too apparent. Free radical generation may be further compounded during a rapid as opposed to a steady controlled descent because of the mechanical trauma of eccentric muscle contractions and greater increase in arterial pO_2 implicit in reoxygenation injury.

But how do these mountaineers achieve such remarkable feats and survive to tell the tale when others falter even at the slightest whiff of hypoxia? The fact that Professor Sharp was effectively a native highlander at the time of his record suggests that acclimatisation may have conferred at least some protection. Or perhaps he is one of the genetically gifted with the I allele of the ACE gene recently associated with improved performance at high altitude?[3] While this remains a riddle wrapped in a mystery inside an enigma, it would seem wise counselling to ensure that those antioxidants are packed before visiting one of nature's wonders!

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1 Sharp C. Exercise at altitude. *Br J Sports Med* 2000;**34**:404.
2 Bailey DM, Davies B, Davison G, *et al*. Free radical damage at high-altitude; isolating the source and implications for the pathophysiology of acute mountain sickness. *Newsletter of the International Society for Mountain Medicine* 2000;**10**:3–13.
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Professionalism and injuries in rugby union

EDITOR,—Garraway *et al*[1] are to be congratulated on their meticulous investigation of the incidence of rugby injuries.

Rugby has a very high incidence of injuries. Garraway *et al* state: "An injury episode occurred in a professional team for every 59 minutes of competitive play"—that is, one serious injury among 30 professional players every 59 minutes. Of greater concern is the fact that Garraway *et al* reported two neck dislocations, one of which resulted in permanent neurological damage, in this recent paper compared with nil in the earlier one.[2]

The question of rugby injuries is an emotive one and I have been concerned, over the years, with the incidence of severe injuries causing tetraplegia. The fact that professional players are suffering a greater number of injuries was apparent from my own researches in 1984[3] on 67 patients with tetraplegia whom I treated. I followed this up in 1992[4] and 1994[5] and found that there was a direct correlation between the standard of play, the fitness of the player, and the number of injuries. My findings suggested that greater skill does not provide protection, as six of the players injured were first class players and there are only about 2000 such players in England compared with a total of 400 000 players at all standards. The large number of injuries sustained on tours supports the view that the stronger and fitter the player, the greater the likelihood of an injury occurring.

The analogy with vehicle accidents is striking, whereby the forces involved and the speed of deceleration are the major factors in determining the severity of the injury. This is confirmed in the first class game where the players run faster and are bigger and heavier and impact with greater force.

Schneider[6] made a separate study of this among American players. He found that 141 serious injuries occurred among 780 000 high school football players, 34 among 70 000 university footballers, and 14 among 4500 professional players, whereas, in Sandlot football, an unskilled form of the game (where players do not wear protective clothing!), 26 injuries occurred among 1 645 000 players. He concluded that unskilled players do not play as hard as highly skilled or professional athletes and that the greater degree of force and skill exaggerates the likelihood of injury.

Garraway *et al*[1] say "where valid comparisons can be made, it appears that professional rugby union produces higher injury rates than professional rugby league." This is not in accord with my earlier findings. It has been suggested that rugby league is a much safer game as the ruck and maul have been abolished. However, the incidence of injury is four players out of 26 000 with broken necks for rugby league versus five players out of 500 000 for rugby union, which does not support this claim.

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Effectiveness of stretching to reduce injury

There appears to be a conflict of ideas in two of the leaders in the October issue of the journal. Reid and McNair[1] state on page 322 that "it is important for rowers to include hamstring stretches in their training programmes", their argument being that stiffness of the hamstrings would prevent pelvic rotation and increase the likelihood of back pain. Shrier,[2] however, demonstrates that there is no evidence that stretching before exercise reduces injury.

May I suggest that these views are not necessarily incompatible. Firstly, it would seem to me that there may be a difference between stretching abnormally tight tissues into a normal range of motion as opposed to stretching normal tissues into an excessive range. Is this difference specified in the studies of the effects of stretching on injury prevention referred to by Shrier? Perhaps it is a semantic quibble, but what is stretching? Secondly, Reid and McNair illustrate the concept of the kinetic chain. Did the studies of the ineffectiveness of stretching look at stretching one link in the kinetic chain to reduce injury elsewhere or were they concerned with merely local effects?

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1 Reid DA, McNair PJ. Factors contributing to low back pain in rowers. *Br J Sports Med* 2000;**34**:321–2.
2 Shrier I. Stretching before exercise: an evidence based approach. *Br J Sports Med* 2000;**34**:324–5.

BOOK REVIEWS

Introduction to clinical neurology. 2nd ed. Douglas J Gelb. (Pp 386; £22.50.) Oxford: Butterworth-Heinemann, 2000. ISBN 07506-7202-1.

General practitioners who have long lost the art of performing and applying the findings of